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ABSTRACT

College teachers are seeking alternatives to the conventional lecture as a means of teaching students. This paper presents five alternative teaching methods and their advantages and disadvantages. It describes a program for instructional method selection design and includes an evaluation matrix for the five methods. The methods examined are the Audio-Tutorial Approach to Learning, Computer-based Education, Guided Design, Learning Packages, and the Personalized System of Instruction. The selection design process involves instructors working with their peers and instructional development consultants to determine the most appropriate teaching method considering the needs, constraints, and personalities of the instructor, students, and department. Among the 24 categories tabulated in the evaluation matrix are: degree of student involvement, instructional support necessary, instructor teaching skill required, preparation time, and student retention of concepts. (JAB)

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INTRODUCTION

Five alternative teaching methods are presented in this paper along with a selection design and evaluation matrix. The purposes of this paper are best described in the following:

1. to provide a framework why faculty in higher education are seeking alternatives to the lecture form of instruction;
2. to describe five effective alternative teaching methods used in higher education;
3. to list the advantages and disadvantages of each instructional method;
4. to provide a selection design, and
5. to provide an evaluation matrix based on references and research.

I. Why Are Faculty Seeking Alternative Teaching Approaches?

For several known and unknown reasons college teachers are turning to alternative approaches to the conventional lecture as a means of teaching students. Perhaps after one reviews the vast research comparing the lecture with other forms of instruction, the lecture appears to have marginal value in certain areas of the teaching/learning process.¹ "Lectures were once useful; but now, when all can read, and books are so numerous, lectures are unnecessary..."² "As a means of imparting information, especially if habitually used, the formal lecture is probably the most ineffective and wasteful of all methods."³

The lecture in its traditional sense has its value as a means of instruction and should not be overlooked. "In spite of its disadvantages, the lecture remains the most effective means by which you may transmit

to your whole class of students the subject matter of your teaching." ⁴

The lecture, then, remains to be significant. However, as instructors study their teaching performance and look at communicating information at higher levels of learning --- they often seek alternative teaching systems to the lecture. "A suspicion arises, however, supported by bits of evidence, that other methods of teaching may be more effective than lecturing in achieving some of the higher level cognitive and attitudinal objectives." ⁵

The concern at this point is to select an approach that will best serve the needs of the teacher and students rather than just replacing an "old idea" with a new one. "...The pressure to 'invent' the new methods comes from an increasing awareness that the old methods are no longer adequate to our needs." ⁶ Before leaping into new styles of teaching, it is advisable that the instructor determine the selection of an approach by using some sort of criteria.

One may ask a number of questions about alternative approaches at this point such as the following: how many possible instructional methods are there? (Probably an infinite amount.) How many instructional methods work effectively? (Probably a finite amount.) Are there a few successful methods in terms of effective learning outcomes in college students? (Probably yes.) Is it possible to point out some descriptions, advantages and disadvantages, and other pieces of information about these few effective instructional methods? (Sure...)

The following five approaches to teaching and learning are selected from several alternatives as these five best represent effective teaching methods founded upon extensive research findings. They are all used

throughout higher education. No intent is made to refute other alternative forms; obviously it would be difficult to evaluate additional forms within the limitations of this paper. For more complete formation on each instructional method, it is recommended that one attend a complete workshop in the specific method.

II. Brief Description of the Five Alternative Teaching Methods

Audio-Tutorial Approach to Learning (AT) ⁷

The AT system is a tutorial format of guiding students' learning on audio-tape format. Using study booths prepared for taped learning activities, the tape directs the student through a unit. The student may be directed to turn off the tape and read a passage in a text, view slides or filmstrips, or examine a few objects placed in the AT booth.

The AT system has three unique components that add flexibility and overall balance to this teaching/learning form. The components are:

1. Independent Study Session (ISS) The students may come in at their convenience and check into a booth. A written set of objectives are issued with the specific unit checked out. The student places headphones into position and listens to a simulated one-to-one tutoring by the instructor. Each student proceeds independently through the unit to achieve the stated objectives for the week. Comfortable surroundings are provided as a means of encouraging students to discuss the units and subject content. The student leaves when he/she feels satisfied with the progress.

2. General Assembly Session (GAS) These large group sessions are scheduled on a weekly basis. Occasional lectures, special films, major exams, and other activities that are best handled in large groups are

scheduled for the GAS. Attendance is required for certain special events.

3. Integrated Quiz Session (IQS). This activity involves eight students and the instructor. The activity is scheduled to meet weekly for one-half hour. The main purpose of this session is to have students learn a subject as they teach the session. Each student prepares a small presentation about each of the items used in the ISS. The instructor presents the items in the sequence programmed earlier and selects the student to lecture on a random basis. Each student must organize the subject matter in their own minds as the instructor may call upon them to respond. The session provides direct feedback, an opportunity for each student to know at least one instructor very well, and vice versa.

Briefly the AT system offers:

1. Emphasis on student learning.
2. Student self-pacing on a weekly basis.
3. Student directed learning activity.
4. Use of senior instructor.
5. Audio programming of learning experiences.
6. Integrated experiences.
7. Independent study sessions.
8. General assembly sessions.
9. Small assembly sessions.
10. Increased personal contact with instructors.

Computer-Based Education (CBE) ⁸

CBE is a broad range of learning activities managed by a computer. The Computer-Assisted Instruction (CAI), a limited meaning of CBE, is a reference to those programs where the computer is used to interact tutorially

with students as they move through instructional sequences or courses. Students interact with the computer at low to high levels of learning, using the computer for remedial and advanced study. Programs such as PLATO offer students a wide-variety of programs in simulated-activities. By applying their knowledge, students can elect a President, clean a dirty river, land a space ship, control a mouse, and other programmed exercises.

CBE offers:

1. Simulation and feedback.
2. Test banks.
3. Wide-range of materials (software).
4. Instant feedback.
5. Testing theories of learning.
6. Immediate access to information.
7. Individualized and group instruction.
8. Drill and practice.
9. Tutorial programs.
10. Computer rapport.

Guided Design ⁹

Guided Design is part system, part attitude. It reshapes the traditional approach to higher education from the ground up by having students, working in small groups, attack problems rather than masses of cold information. It is based on the conviction that the student can be brought to acquire whatever factual or technical knowledge he or she needs as one works his or her way through an ascending order of well-designed problems. The central idea behind all this is that the student who is actively seeking

solutions to problems rather than passively assimilating knowledge will emerge not only better educated but far stronger intellectually.

The learning process in Guided Design revolves around students' efforts to devise solutions for a series of increasingly complex open-ended problems. While there is no single correct answer to any of the problems, each requires students to put into play certain kinds of information and skills in order to decide upon a feasible solution. The professor selects the problems according to the skills and content he or she wants the students to learn.

The manner in which students deal with the problems is carefully programmed. Each problem is broken down into sequenced stages or steps. Students must deal with each stage in order and are not permitted to progress to a new stage until they have adequately considered and dealt with the preceding stage or stages.

Students work in groups of from four to seven members, and it is as a group that they formulate their plan for tackling each stage. As intended by the professor in his or her selection and sequencing of the problem, the group quickly discovers that certain kinds of information are needed in order to make appropriate decisions. These needs have been anticipated by the preparation of a library of materials - traditional and programmed texts, reference books, audio tapes, etc. - which students are free to consult.

The group may divide the task of searching for required information among its individual members. However, the information so gathered is always brought back to the group to provide optimum conditions for group problem-solving, with its give and take of ideas, insights, and opinions.

When the group has decided upon its action for the stage of the problem

under consideration, it is given written feedback materials, prepared in advance by the instructor. The materials discuss a number of possible decisions the group may have reached at this point in its problem-solving, elaborating upon the strengths and weaknesses of each. The students compare the pros and cons of their decision with those of other decisions they might have made. Following this evaluation, they are allowed to advance to the next stage of the problem.

Specifically Guided Design offers:

1. A focus on developing the students' decision-making skills.
2. Teaches specific concepts and principles.
3. Use of Instruction-Feedback.
4. Students working in small groups to solve meaningful open-ended problems.
5. Students thinking logically, gathering information, communicating ideas, and using decision-making steps.
6. Teachers serving as consultants, guides, promoters of learning, and manager.
7. Students doing the thinking, making value judgments.
8. Organized disciplines.

Learning Packages ¹⁰

Learning Packages are known by several names: Learning Activity Packages - LAP, Individualized Learning Packages - ILPs, Teaching Learning Units - TLUs, and UNIPAC. The simplest definition of learning package is a systemized way of delivering content and process to learners. The common elements of the various types of learning packages are:

1. Pre-test - designed to determine readiness, prerequisites, and student need for the lesson.
2. Main concept - stated in a declarative sentence and related to a time element.
3. Component parts (parts to be learned) - stated in words or phrases to limit the otherwise limitless scope of any declarative sentence.
4. The behavioral objectives -- written behaviorally with major emphasis on level of proficiency. Related directly to terminal performance desired regarding each component.
5. Instructions for selection of activities -- the first element of a recycling device.
6. The diversified activities -- three or more per objective, diversified for entry and access rather than for reinforcement (may reinforce, however).
7. The self-test - a decision point for the student and a protection against public failure.
8. Post-test identical to the objectives, the teacher's portion of the mutual contract.
9. Quest -- the opportunity to go beyond the objectives learned, under any condition which will be profitable to the student.
10. The field test -- an application of the package to determine its success and usefulness.

Personalized System of Instruction (PSI) ¹¹

The five characteristics of the PSI system are as follows:

1. (Student self-pacing) Students are allowed to self-pace themselves through the course materials. Unlike AT, students in PSI course may remain out of step with the weekly objectives and unit materials most of the term or semester. As the individual differences in learning and communication skills are tolerated in PSI, the courses are set up for this variation in learning rate.

2. (Unit-perfection requirement) Mastery learning or unit perfection requirements are an essential concept in PSI. The students must demonstrate mastery of one learning unit before proceeding to the next. Students are rewarded (reinforced) for mastery of subject matter. In theory, PSI courses give an A (reward) for mastery of unit requirements and ignores an incomplete (no punishment) for failure to achieve mastery. The basis of PSI is built upon this reinforcement theory.

3. (Use of lectures as motivators) Lectures are used for motivation rather than for information. The lectures offer the opportunity to get the entire class together. The instructor has a chance to appear at his or her inspirational best. The role of the instructor in the PSI format is changed from that of lecturer and grader to that of a course facilitator, organizer of materials, and partner in the learning process.

4. (Emphasis upon the written word) The stress is primarily upon the written word to be the vehicle of instruction. Textbooks, readings, and study guides that program the course into learning units are the main instructional materials. Like AT courses, PSI clearly defines the objectives in the course literature.

5. (Use of proctors) The use of proctors is considered to be one of the most important features of PSI. Undergraduate students usually serve as peer tutors. PSI courses place emphasis on personalization.

III. Advantages and Disadvantages of the Five Alternative Teaching Methods

Audio-Tutorial: ⁷

(Advantages)

1. The main instructor (best or most efficient) can prepare the audio-tapes and serve as the tutor.
2. The learning rate is mostly controlled by the student.
3. The system is designed for success.
4. Course content is flexible to allow for the interests of the students.
5. Efficient use of facilities, staff and student time can be achieved.
6. Students can learn in a comfortable environment.

(Disadvantages)

1. The development of materials, tests, mini-courses takes a tremendous amount of time, initially.
2. Students must assume a greater degree of responsibility.
3. The teacher may feel the loss of authority and control as one might feel through constant lecturing.
4. There is a tremendous amount of equipment, room, extras, and etc. that are necessary to teach the course.
5. Students may get the feeling of being programmed.

Computer-Based Education: ⁸

(Advantages)

1. Students have an opportunity to make mistakes without anyone knowing about their errors.
2. A wide variety of programs (simulation models) are available.
3. The computer may make provisions for most disciplines.
4. Students receive instant feedback.
5. Concepts learned can often be carried over to vocations.

6. The materials are organized logically.

(Disadvantages)

1. Instructors need thorough knowledge of programming to create their own programs.
2. Students often "fear" the computer.
3. The initial cost is very expensive.
4. Instructors fear that they will be replaced by the computer.
5. The computer can only be effective if instructors have a clear idea of its potential use.
6. The computer may "breakdown" or require "down time" during the lesson.

Guided Design:⁹

(Advantages)

1. Guided Design brings knowledge alive as the tool of an active mind seeking orderly solutions to complex problems.
2. This approach uses real life experiences and students can easily transfer the learning to vocations.
3. Students must explore issues using different opinions, inputs, values, and recommendations in the decision-making process.
4. Students learn how to effectively use the decision-making process.
5. Students are resources of knowledge and become very involved in their learning.

(Disadvantages)

1. It becomes difficult to handle classes larger than 35-40 students.
2. Certain facilities will not allow students to break into small groups.
3. Students have a difficult time adjusting back to traditionally taught courses.
4. Instructors must be good narrative writers.

5. Much time is required to create Guided Design Projects.

Learning Packages: 10

(Advantages)

1. The objectives of the packages are obtainable.
2. The packages are fully self-contained.
3. The emphasis is upon performance outcomes.
4. Students can by-pass packages where they already meet the performance criteria.
5. The teacher can check on the student's progress at the beginning and ending of the package.

(Disadvantages)

1. This system requires a keen sense of organization.
2. Packets often need updating, revising, and refurbishing.
3. Students often find the packets very impersonal.
4. The instructor must be a good writer.
5. A good checkout system is mandatory, which requires the teacher to monitor the packages continually.

Personalized System of Instruction: 11

(Advantages)

1. Students may go at their own learning pace.
2. Students may repeat tests until they pass.
3. PSI does not depend on AV equipment which fails frequently.
4. PSI is built upon a positive (rewarding) structure.
5. Students "master" the course materials.

(Disadvantages)

1. Other instructors (non-PSIers) complain about the grade inflation in PSI courses.

2. Students often put the assignments off until late in the term and are given incompletes.
3. The instructor takes on a role often foreign to his or her make up such as a facilitator and not an instructor.
4. Students have difficulty adjusting to PSI at first.
5. The instructor must organize extra tests, tutors work, student progress checks, and other "busy" work aside from instruction.

IV. Instructional Methods Selection Design

Here, at Oregon State University's Instructional Resources and Materials Center (IRAM) and the College and University Teaching (CAUT) Project, consultation is provided in instructional development. As part of the design of a course, instructors proceed through a selection design with peers and instructional development consultants to determine the most appropriate instructional teaching method.

As professors seek consultation, the instructional consultant designs a needs assessment tool or procedure as a means of ferreting out the specific needs of the students, instructor, department or discipline, and vocational specifications for future employment.

The consultant continues to identify the constraints and limitations of the instructor, department, and subject matter. The personality of the instructor is taken into consideration along with the characteristics of the students, and peer influences.

Working with the instructor, the consultant recommends at this stage in the design to develop learning and course objectives. A storyboard plan is developed to sequence the instruction. This may suggest

how much material is to be covered and the most appropriate order of events.

Teaming together, the instructor and consultant affirm what funds are available (if the project is going to be extensive), what granting agency is open for application of instructional development funds, and what administrative support is available to back the project.

The next step is to confirm what resources are available for the instructor. A quick check of the campus resources (human and non-human) is confirmed to use this information as a guideline.

Working with the past course surveys and evaluation reports in a confidential setting, the consultant reviews the data to determine the areas of strengths and weaknesses.

The consultant, then, interviews the instructor to determine the success and failures with any alternative approaches. The consultant, here, is not quick to make any hard and fast judgments, that is -- the lecture may be the best approach for this instructor. No one approach is either pushed upon the instructor; the final selection is a joint decision.

As a decision is about to occur in terms of selecting an alternative approach to teaching, the consultant with the input of the instructor--formulates a list of the advantages and disadvantages of that particular teaching approach. This tends to help the instructor focus upon what he or she considers most appropriate to use as a teaching approach.

These decisions and bits of data that have been collected are evaluated by presenting it to colleagues, administration, and advisory committees. This feedback enables the instructor to make his or her final selection.

The next step is to implement the selection design by taking the most efficient route to develop up units, projects, or mini-courses using instructional design and development criteria and guidelines.

The consultant follows the development to determine if the instructional methods selection design provided for the needs of the instructor, students, discipline, and the university community.

As the instructor plans to develop further courses, this loop as viewed in Figure I is repeated.

V. Evaluation Matrix Based Upon References and Research [12,13,14,15,16]

The evaluation matrix is provided as a guide to provide input to the instructor. (See Figure II .) The information that is contained in the matrix is based upon the findings and research of different sources. The matrix is not guaranteed to be used as an absolute entity. Your final choice (see number 30 may be more than one alternative form.) The author has reservations about a few of these points, but can agree with most of the information.

Definitions and clarifications:

-Feedback Lecture, Programmed is based upon learning and motivation principles. Objectives of the lecture are written out in advance; students are provided with a study guide for the lecture; active participation on the part of the student is encouraged in "time-out periods" for discussion; the lecture is summarized at the end, and student learning and attitudes are assessed at the end of the lecture.

- Letter D = Audio-Tutorial
- Letter E = Guided Design
- Letter F = Personalized System of Instruction
- Letter G = Computer Based Education
- Letter H = Computer Assisted Instruction
- Letter I = Learning Packages

-The (I) on number nine refers to the initial cost of putting in computer equipment

FIGURE I

INSTRUCTIONAL METHODS SELECTION DESIGN

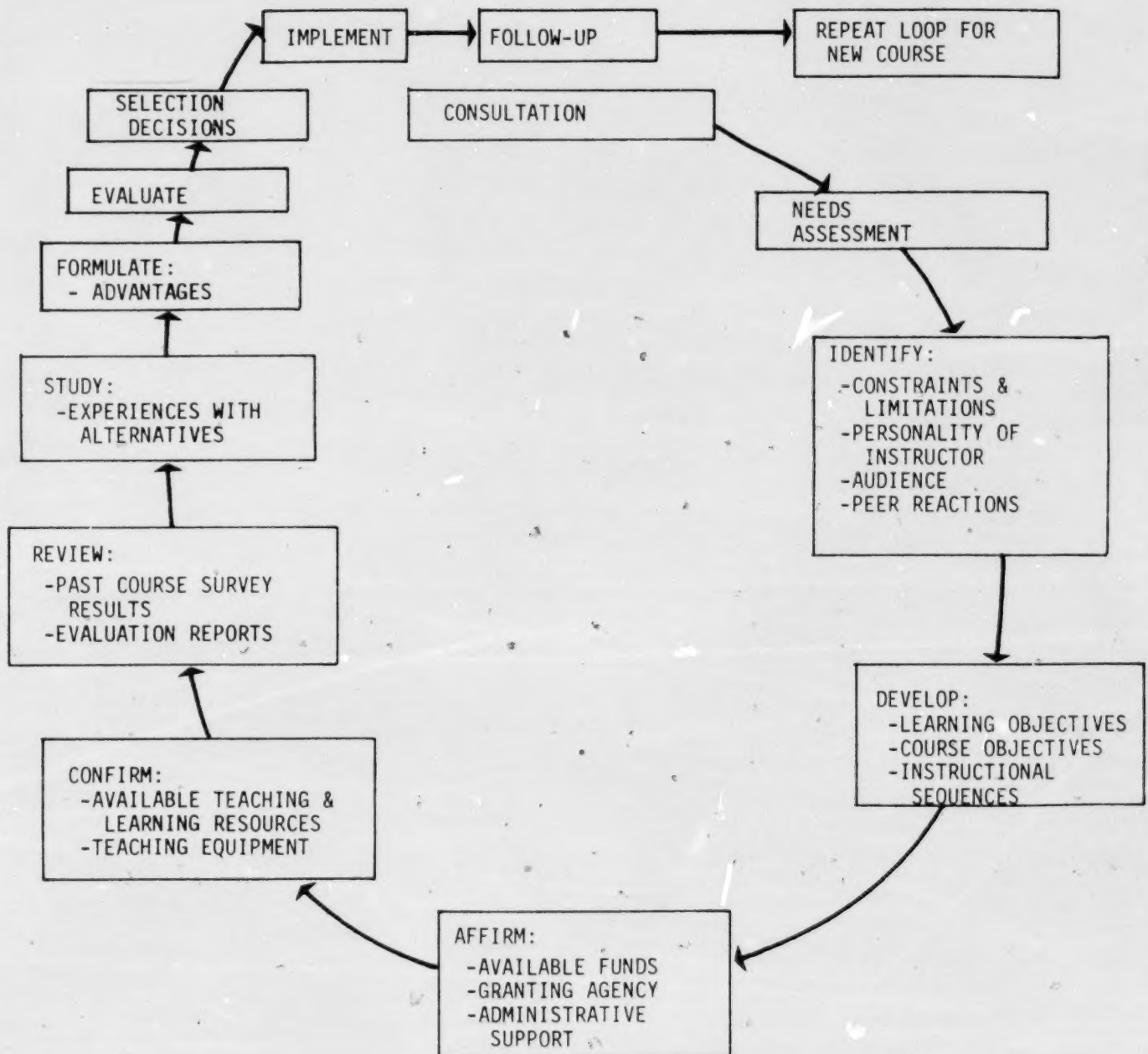


FIGURE II:

EVALUATION MATRIX BASED UPON RESEARCH
Methods

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	A	B	C	D	E	F	G	H	I
	Lecture (conventional)	Lecture with supple- mentary aids - Films, AV-aids	Feedback Lecture, Programmed	AT	GD	PSI	CBE	CAI	LP
1. Student-oriented (control)	low	low-mod	mod	high	high	high	high	high	high
2. Teacher-oriented (control)	high	low-mod	mod	low	low-mod	low	low	low	low
3. Transfer to "real life" conditions	low	low	low	low	high	low	low	high	low
4. Capability to reach high-levels of learn- ing (analysis, synthesis)	low	low-mod	mod	mod	high	low	low	mod	low
5. Capability of handling routine - instruction	low	mod-high	low	high	low	high	high	high	high
6. Degree of student in- volvement	low	low	mod-high	high	high	high	high	high	high
7. Instructor teaching skill, necessary	mod	low-mod	high	low	high	low	low	low	low
8. Instructional support, necessary	none	mod	low-mod	much	low	low	low	much	mod
9. Cost-effectiveness - time and money	high	mod-high	high	high	high	low-mod (I)	low-mod (I)	low	low
10. Departmental constraints (energy, FTE re-schedu- ling peer-problems)	little	some	little	much	much	much	much	much	much

	A	B	C	D	E	F	G	H	I
11. Favorable for outgoing instructor (overt)	yes	yes	yes	yes	yes	no	no	no	no
12. Favorable for shy instructor (covert)	no	yes/no	yes/no	yes	yes	yes	yes	yes	yes
13. Able to assess students' needs	no	no	yes	yes	yes	yes	yes	yes	yes
14. Preparation time - needed	little	little	some - much	much	much	much	much	much	much
15. Transfers decision-making	low	low-mod	low-mod	mod	high	mod	mod	mod	mod
16. Feedback to students	little	low	mod	high	high	high	high	high	high
17. Useful in all disciplines	high	high	high	mod	mod	mod	mod	mod	mod
18. Open-ended problem solving	little	low-mod	mod	mod	high	mod	mod	high	mod
19. Individualized instruction	no	no	no	yes	no	yes	yes	yes	yes
20. Small group instruction	no	no/yes	yes	yes	yes	no	no	no	no
21. Large group instruction	yes	yes	yes	yes	no	no	no	no	no
22. Student retention of concepts over time	little	low	low-mod	low-mod	high	low-mod	low-mod	low-mod	low-mod
23. Specific funding sources available	no	no	no	NSF	Exxon	no	no	NSF	no
24. Storage area necessary	none	yes	none	yes	low	low	yes	yes	yes

	A	B	C	D	E	F	G	H	I
25. Generates possible solutions	low	low-mod	mod	low-mod	high	low-mod	low-mod	mod	low-mod
26. Instructional development assistance	little	mod	mod	high	high	high	high	high	high
27. Stimulates research possibilities	little	low	mod	mod-high	high	high	high	high	mod-high
28. Amount of instructor's time to gear up	little	mod	mod	much	much	much	much	much	much
29. Popularity within Higher Education	high	average	low	low	low	low	low	low	low
30. Your choice:									

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